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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/573,966

03/30/2006

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Q94029

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23373 7590 04/16/2009
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EXAMINER

KERNS, KEVIN P

ART UNIT

PAPER NUMBER

1793

MAIL DATE

DELIVERY MODE

04/16/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/573,966	Applicant(s) KUBOTA ET AL.	
	Examiner Kevin P. Kerns	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 March 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 1-5, 12 and 13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 6-11 and 14-18 is/are rejected.
- 7) ☒ Claim(s) 1-5, 12 and 13 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3/30/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicants' election without traverse of Group II (claims 6-11 and 14-18) in the reply filed on March 25, 2009 is acknowledged.

Specification

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

In this instance, the abstract exceeds 150 words, is written in two paragraphs, and includes the legal term "comprises".

3. The disclosure is objected to because of the following informalities: on page 1, 22nd line, replace "super alloy" with "superalloy". On page 2, 6th and 8th lines, replace "to" with "for" after "tried". On page 16, 10th line, and page 17, 2nd line, replace "slid" with "slide". On page 18, 17th line, replace "hundreds" with either "hundred" or "hundreds of" before "microns". Appropriate correction is required.

Claim Objections

4. Withdrawn claims 1-5, 12, and 13 are objected to because of the following informalities: the status identifiers of these withdrawn claims should be changed to either “(withdrawn)” or “(cancelled)” in the next communication by applicants (to avoid a notice of non-compliant amendment letter). Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 9, 14, 15, 17, and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 9 recites the limitation "the center shaft" in the 3rd line of the claim. There is insufficient antecedent basis for this limitation in the claim. In this instance, it is believed that "shaft" should be replaced with "axle" to obtain proper antecedent basis with "a center axle" of independent claim 6.

With regard to claim 9, it is not clear what is meant by “a perpendicular”, and it is believed that this should be revised to read “perpendicular with respect to the plane” (or an equivalent structure arranged in a perpendicular manner).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 6-9, 11, 14, 15, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Decker et al. (US 2002/0187060) in view of JP 2002-113749.

Regarding independent claim 6, Decker et al. disclose a cast titanium compressor wheel and a method of manufacturing an impeller for superchargers by a lost wax casting process (abstract; paragraphs [0001], [0022]-[0024], [0030]-[0038], [0053]-[0057], [0062]-[0064], and [0067]-[0087]; and Figures 2, 4, and 6-11), in which the impeller (compressor wheel 11 of Figures 2 and 4) comprises a disk-shaped hub 12 defining a hub base 13 extending radially from a center axle, a plurality of blades

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(14,15) extending from the hub 12, such that the blades (14,15) consist of alternately arranged full (14) and splitter (15) blades each having an aerodynamic curved surface (see paragraph [0053]), wherein a space defined by each pair of adjacent blades (14,15) forms an undercut extending radially from the center axle, wherein the method includes the following steps:

forming a sacrificial (lost wax) pattern 21 (Figures 7, 8, and 10) having substantially the same form as the impeller 11 to be cast from molten titanium;

coating the sacrificial (lost wax) pattern 21 with a refractory material (in the form of an investment casting slurry that forms an investment shell mold that is operable to withstand molten titanium, which is reactive when molten – see paragraphs [0063] and [0082]), and subsequently thermally removing (by heating) the sacrificial pattern 21 to form a casting (shell) mold; and

casting the impeller 11 by using the casting (shell) mold, wherein the step of forming the sacrificial (lost wax) pattern 21 includes injecting a sacrificial material (wax) into a cavity defined by a plurality of slide dies (die inserts 20 of Figures 7-10) that are arranged radially toward the center axle, and subsequently moving the slide dies 20 radially outwardly while rotating via offset arms 22 (see Figures 9 and 10) to release them from the sacrificial pattern 21.

Decker et al. do not disclose that each of the plurality of slide dies has a groove that defines the forms of the splitter blades and spaces between an adjacent pair of full blades.

However, JP 2002-113749 discloses a mold for injection molding of impellers via lost wax casting (abstract; and Figures 1-5), in which the mold includes a plurality of radially arranged slide dies 7 that slide along respective grooves in the base of a bottom die surface, such that the slide dies are arranged between adjoining (full or splitter) blades to form blade cavities (respective spaces between the plurality of blades) and are freely movable in a radial direction via rotating and retreating means (abstract), with these features being advantageous for providing a slide die in a groove within a mold that is operable to mold impellers with overlapping blades by lost wax casting (abstract).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the method of manufacturing an impeller for superchargers by a lost wax casting process, as disclosed by Decker et al., by modifying the slide dies to have respective grooves that define the forms of the splitter blades and spaces between an adjacent pair of full blades, as taught by JP 2002-113749, in order to provide a slide die in a groove within a mold that is operable to mold impellers with overlapping blades by lost wax casting (JP 2002-113749; abstract).

Regarding claims 7 and 14, JP 2002-113749 discloses movable and stationary dies (4,5) in combination with the slide dies 7 that are movable in conjunction with respective slide supports in the base of a bottom die surface, such that the sacrificial (lost wax) pattern is formed within the die assembly (abstract; and Figures 1-5).

Regarding claims 8 and 15, JP 2002-113749 includes the teachings that each of the slide dies 7 comprises a plurality of cores (10,11,12) bonded integrally to one another (abstract; and Figures 3 and 5).

Regarding claim 9, Decker et al. disclose that motional lines (arrows of Figures 8 and 10) are defined in terms of a rotational component and XY coordinates on a two-dimensional plane for releasing each of the slide dies (die inserts 20) from the sacrificial pattern 21, to which the center shaft (or center axle) of the impeller 11 is arranged in a perpendicular manner.

Regarding claims 11 and 17, Decker et al. disclose that a titanium alloy (including a titanium-aluminum alloy) is cast into the casting mold (paragraph [0055]).

10. Claims 10, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Decker et al. (US 2002/0187060) in view of JP 2002-113749, as applied to claims 6, 11, 14, 15, and 17 above, and further in view of Takayanagi (US 5,394,933).

Decker et al. (in view of JP 2002-113749) disclose and/or suggest the features of claims 6, 11, 14, 15, and 17. Neither Decker et al. nor JP 2002-113749 discloses that the casting mold is formed by coating a sacrificial pattern with two separate coatings that are dried and treated at high temperatures prior to the casting process.

However, Takayanagi discloses a casting mold core for casting titanium and titanium alloys (abstract; column 1, lines 8-16 and 41-68; column 2, lines 9-54; and Examples 1-10), including its use for manufacture of a pump impeller (Examples 2 and 7), in which the mold core comprises providing a sacrificial pattern (paraffin wax), providing a first coating of zirconia- or yttria-based refractory materials (abstract), providing a second coating by immersing the core in an alumina powder (Example 7),

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thermally removing the sacrificial pattern (wax) by heating to 500°C for 24 hours, and sintering/calcing to 1,300°C for 1 hour, in order to make a core for use in an investment casting mold for production of a pump impeller made of titanium or titanium alloys, such that the core has increased strength with low reactivity toward titanium/titanium alloys (column 2, lines 22-37).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the method of manufacturing an impeller for superchargers by a lost wax casting process, as disclosed by Decker et al., by modifying the slide dies to have respective grooves that define the forms of the splitter blades and spaces between an adjacent pair of full blades, as taught by JP 2002-113749, in order to provide a slide die in a groove within a mold that is operable to mold impellers with overlapping blades by lost wax casting, and by further forming the casting mold by coating a sacrificial pattern with two separate coatings that are dried and treated at high temperatures prior to the casting process, as disclosed by Takayanagi, in order to make a core for use in an investment casting mold for production of a pump impeller made of titanium or titanium alloys, such that the core has increased strength with low reactivity toward titanium/titanium alloys (Takayanagi; column 2, lines 22-37).

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicants' disclosure. The Fries et al., Galliger, and Miller references are also cited in PTO-892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin P. Kerns whose telephone number is (571)272-1178. The examiner can normally be reached on Monday-Friday from 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on (571) 272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kevin P. Kerns
Primary Examiner
Art Unit 1793

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Primary Examiner, Art Unit 1793
April 9, 2009